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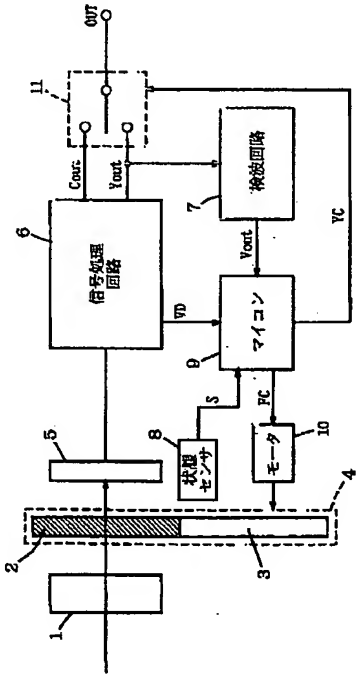
(54)【発明の名称】　白黒／カラー切換カメラ

(57)【要約】

【課題】　外部の明るさに応じて自動的にカラー映像と白黒映像との切換が可能なカメラを提供する。

【解決手段】　検波回路７からの積分値と所定のしきい値とを比較し、その結果に応じてフィルタ切換信号および白黒／カラー切換信号を出力するマイコン９と、フィルタ切換信号を受けてレンズ１とＣＣＤ５との間にＩＲカットフィルタ２またはダミーガラス３を抜き差しするモータ１０と、白黒／カラー切換信号を受けてカメラの出力端子ＯＵＴにカラー信号または白黒信号を出力する切換スイッチ１１とを備える。



る。

【0007】この発明は以上のような課題を解決するためになされたもので、その目的は、外部が暗くても明るくても鮮明な映像を得ることができるカメラを提供することである。

【0008】この発明のさらなる目的は、外部の明るさに応じて自動的にカラー映像と白黒映像を切換えることができるカメラを提供することである。

【0009】

【課題を解決するための手段】この発明に従うと、白黒／カラー切換カメラは、撮像素子と、赤外カットフィルタと、信号処理手段と、フィルタ切換手段と、信号切換手段とを備える。信号処理手段は、撮像素子からの信号に応じて白黒信号およびカラー信号を生成する。フィルタ切換手段は、外部の明るさが所定の明るさよりも明るいときは撮像素子の受光側に赤外カットフィルタを挿入し、外部の明るさが所定の明るさよりも暗いときは撮像素子の受光側から赤外カットフィルタを抜き取る。信号切換手段は、外部の明るさが所定の明るさよりも明るいときは信号処理手段で生成されるカラー信号を選択して出力し、外部の明るさが所定の明るさよりも暗いときは信号処理手段で生成される白黒信号を選択して出力する。

【0010】上記白黒／カラー切換カメラにおいては、外部の明るさが所定の明るさよりも明るいときは、撮像素子の受光側に赤外カットフィルタが挿入される。これにより赤外領域の波長成分が除去された光が撮像素子の受光部へ照射され、信号処理手段で生成されるカラー信号は赤外領域の成分を含まず色再現性の良い良好なものとなる。このカラー信号が信号切換手段によって選択され外部へ出力される。

【0011】一方、外部の明るさが所定の明るさよりも暗いときは、撮像素子の受光側から赤外カットフィルタが抜き取られる。これにより、赤外領域の波長成分をも含んだ光が撮像素子の受光部へ照射され、信号処理手段で生成される白黒信号は赤外領域の波長成分を含んだものとなる。この白黒信号が信号切換手段によって選択され外部へ出力される。

【0012】好ましくは、上記白黒／カラー切換カメラはさらに、信号処理手段で生成される白黒信号を入力に受け、白黒信号が所定のしきい値よりも大きいときは第1のフィルタ切換信号および第1の白黒／カラー切換信号を出力し、白黒信号が所定のしきい値よりも小さいときは第2のフィルタ切換信号および第2の白黒／カラー切換信号を出力する判別手段を備える。上記フィルタ切換手段は、第1のフィルタ切換信号を受けたときは撮像素子の受光側に赤外カットフィルタを挿入し、第2のフィルタ切換信号を受けたときは撮像素子の受光側から赤外カットフィルタを抜き取る。上記信号切換手段は、第1の白黒／カラー切換信号を受けたときは信号処理手段で生成されるカラー信号を選択して出力し、第2の白黒／カラー切換信号を受けたときは信号処理手段で生成される白黒信号を選択して出力する。

【0013】以上のように構成された白黒／カラー切換カメラにおいては、信号処理手段で生成される白黒信号のレベルは外部の明るさに応じて変動する。この白黒信号のレベルを判別手段により検出して所定のしきい値と比較する。その結果、白黒信号のレベルが所定のしきい値よりも大きいときは判別手段からフィルタ切換手段へ第1のフィルタ切換信号が送られ、判別手段から信号切換手段へ第1の白黒／カラー切換信号が送られる。これらの信号を受けて、フィルタ切換手段は撮像素子の受光側に赤外カットフィルタを挿入し、信号切換手段は信号処理手段で生成されるカラー信号を選択して外部へ出力する。

【0014】白黒信号のレベルが所定のしきい値よりも小さいときは、判別手段からフィルタ切換手段へ第2のフィルタ切換信号が送られ、判別手段から信号切換手段へ第2の白黒／カラー切換信号が送られる。これらの信号を受けて、フィルタ切換手段は撮像素子の受光側から赤外カットフィルタを抜き取り、信号切換手段は信号処理手段で生成される白黒信号を選択して外部へ出力する。

【0015】好ましくは、上記白黒／カラー切換カメラはさらに、照度検知手段と、判別手段とを備える。照度検知手段は、外部の明るさを検知して照度信号を出力する。判別手段は、照度信号を受け、照度信号が所定のしきい値よりも大きいときは第1のフィルタ切換信号および第1の白黒／カラー切換信号を出力し、照度信号が所定のしきい値よりも小さいときは第2のフィルタ切換信号および第2の白黒／カラー切換信号を出力する。また、上記フィルタ切換手段は、第1のフィルタ切換信号を受けたときは撮像素子の受光側に赤外カットフィルタを挿入し、第2のフィルタ切換信号を受けたときは撮像素子の受光側から赤外カットフィルタを抜き取る。また、信号切換手段は、第1の白黒／カラー切換信号を受けたときは信号処理手段で生成されるカラー信号を選択して出力し、第2の白黒／カラー切換信号を受けたときは信号処理手段で生成される白黒信号を選択して出力する。

【0016】以上のように構成された白黒／カラー切換カメラにおいては、照度検知手段で生成される照度信号のレベルは外部の明るさに応じて変動する。この照度信号のレベルを判別手段により検出して所定のしきい値と比較する。その結果、照度信号のレベルが所定のしきい値よりも大きいときは判別手段からフィルタ切換手段へ第1のフィルタ切換信号が送られ、判別手段から信号切換手段へ第1の白黒／カラー切換信号が送られる。これらの信号を受けてフィルタ切換手段は撮像素子の受光側に赤外カットフィルタを挿入し、信号切換手段は信号処

理を行なう。

【0028】以下、マイコン9の処理について説明する。図2は、図1に示されるマイコン9の処理手順を示すフローチャートである。図2を参照して、まずステップS1において、信号処理回路6からマイコン9へ垂直同期信号VDが入力される。

【0029】続いてステップS2において、検波回路7からの積分値Voutを取込む。続いてステップS3において、積分値Voutとしきい値V0との比較を行なう。以下、積分値Voutがしきい値V0よりも大きい場合と小さい場合とに分けて説明する。

【0030】(a)　Vout＞V0の場合

この場合は、外部の明るさが所定の明るさよりも明るい場合に該当し、カメラから出力される映像信号をカラー信号Coutとするために以下の処理がなされる。

【0031】まず、ステップS4において、状態センサ8からの状態信号Sを取込む。状態信号SがLレベルのときは、レンズ1とCCD5との間にIRカットフィルタ2が挿入されている状態であり、またカメラの出力端子OUTからはカラー信号Coutが出力されている状態であるため、ステップS8に進みマイコンの処理が終了する。

【0032】状態信号SがHレベルのときは、レンズ1とCCD5との間にダミーガラス3が挿入された状態であり、カメラの出力端子OUTからは白黒信号Youtが出力されている状態であるためステップS5へ進む。

【0033】続いてステップS5において、Hレベルのフィルタ切換信号FCをモータ10へ出力し、Hレベルの白黒／カラー切換信号YCを切換スイッチ11へ出力する。Hレベルのフィルタ切換信号FCを受けたモータ10は、スライド機構4を駆動してレンズ1とCCD5との間からダミーガラス3を抜き取りIRカットフィルタ2を挿入する。また、Hレベルの白黒／カラー切換信号YCを受けた切換スイッチ11は、白黒信号Yout側に接続されている出力端子OUTをカラー信号Cout側に接続する。この結果、カメラの出力端子OUTからはカラー信号Coutが出力されることになる。

【0034】続いてステップS8に進みマイコンの処理が終了する。

(b)　Vout＜V0の場合

この場合は、外部の明るさが所定の明るさよりも暗い場合に該当し、カメラから出力される映像信号を白黒信号Youtとするために以下の処理がなされる。

【0035】まず、ステップS6において、状態センサ8からの状態信号Sを取込む。状態信号SがHレベルのときは、レンズ1とCCD5との間にダミーガラス3が挿入されている状態であり、またカメラの出力端子OUTからは白黒信号Youtが出力されている状態であるため、ステップS8に進みマイコンの処理が終了する。

【0036】状態信号SがLレベルのときは、レンズ1とCCD5との間にIRカットフィルタ2が挿入された状態であり、またカメラの出力端子OUTからはカラー信号Coutが出力されている状態であるためステップS7へ進む。

【0037】続いてステップS7において、Lレベルのフィルタ切換信号FCをモータ10へ出力し、Lレベルの白黒／カラー切換信号YCを切換スイッチ11へ出力する。

【0038】Lレベルのフィルタ切換信号FCを受けたモータ10は、スライド機構4を駆動してレンズ1とCCD5との間からIRカットフィルタ2を抜き取りダミーガラス3を挿入する。

【0039】また、Lレベルの白黒／カラー切換信号を受けた切換スイッチ11は、カラー信号Cout側に接続されている出力端子OUTを白黒信号Yout側に接続する。この結果、カメラの出力端子OUTからは白黒信号Youtが出力されることになる。

【0040】続いてステップS8に進みマイコンの処理が終了する。以上のようにこの実施の形態1によれば、検波回路7と、マイコン9と、モータ10と、切換スイッチ11とを設けることにより、検波回路7からの積分値Voutが所定のしきい値V0よりも大きいときは、レンズ1とCCD5との間にIRカットフィルタ2が挿入されてカメラの出力端子OUTからはカラー信号Coutが出力され、検波回路7からの積分値Voutが所定のしきい値V0よりも小さいときは、レンズ1とCCD5との間にダミーガラス3が挿入されてカメラの出力端子OUTからは白黒信号Youtが出力される。その結果、外部の明るさに応じて自動的にカラー映像と白黒映像とを切換えるカメラを提供することができる。また、外部の明るさを白黒信号Youtのレベルによって検知するため、特別に測光センサなどを用いる必要がないため、簡単な構成で実現できる。

【0041】[実施の形態2]図3は、この発明の実施の形態2による白黒／カラー切換カメラの全体構成を示すブロック図である。図3を参照して、この白黒／カラー切換カメラは、図1に示された検波回路7の代わりに照度センサ12を備える。

【0042】照度センサ12は、外部の明るさを検知してその明るさに応じた照度信号Vsを出力する。

【0043】この実施の形態2では、マイコン9において照度信号Vsと予め設定されたしきい値V0とを比較し、その結果に応じてカメラの出力をカラー信号または白黒信号にするための処理を行なう。

【0044】以下、マイコン9の処理について説明する。図4は、図3に示されるマイコン9の処理手順を示すフローチャートである。図4を参照して、まずステップS11において、信号処理回路6からマイコン9へ垂直同期信号VDが入力される。

【0045】続いてステップS12において、照度セン

るフィルタ切換手段を備えるため、赤外カットフィルタが挿入されていると否とにかかわらず撮像素子の受光面に結像される光学像の焦点を一定に保つことができる。

【図面の簡単な説明】

【図１】この発明の実施の形態１による白黒／カラー切換カメラの全体構成を示すブロック図である。

【図２】図１に示されたマイコンの動作を示すフローチャートである。

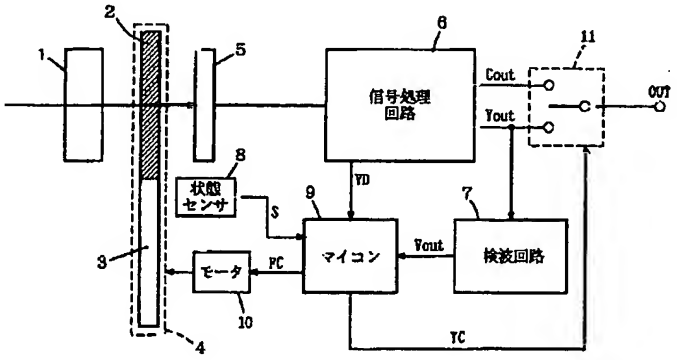
【図３】この発明の実施の形態２による白黒／カラー切換カメラの全体構成を示すブロック図である。

【図４】図３に示されたマイコンの動作を示すフローチャートである。

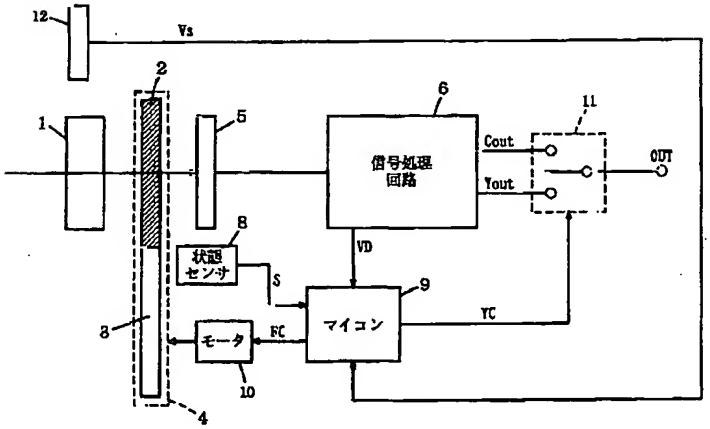
【符号の説明】

２　ＩＲカットフィルタ
３　ダミーガラス
４　スライド機構
５　ＣＣＤ
６　信号処理回路
９　マイコン
１０　モータ
１１　切換スイッチ
１２　照度センサ
Ｃｏｕｔ　カラー信号（コンポジット・ビデオ信号）
Ｙｏｕｔ　白黒信号（輝度信号）
ＦＣ　フィルタ切換信号
ＹＣ　白黒／カラー切換信号

【図１】



【図３】



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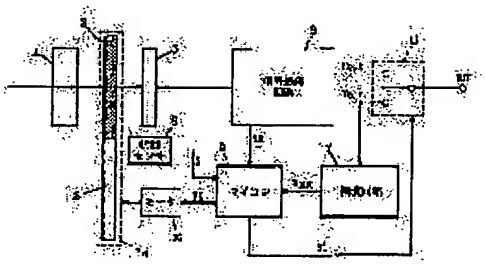
(54) BLACK AND WHITE/COLOR SWITCHING CAMERA

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a camera that automatically selects a color video image or a black/white video image in response to external light.
SOLUTION: A camera is equipped with microcomputer 9 that compares an integrated value from a detection circuit 7 with a prescribed threshold and provides an output of a filter switching signal and a black and white/color switching signal depending on the result, a motor 10 that receives the filter switching signal and inserts/withdraws an IR cut filter 2 or a dummy glass 3 between a lens 1 and a CCD 5, and a changeover switch 11 that receives the block and white/color switching signal and through which a color signal or a black/white signal is outputted to an output terminal OUT of the camera.



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[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] An image sensor, an infrared cut-off filter, and a signal-processing means to generate a monochrome signal and a color signal according to the signal from said image sensor, When external brightness is brighter than predetermined brightness, said infrared cut-off filter is inserted in the light-receiving side of said image sensor. The filter means for switching which samples said infrared cut-off filter from the light-receiving side of said image sensor when the brightness of said exterior is darker than predetermined brightness, The color signal generated with said signal-processing means when the brightness of said exterior is brighter than said predetermined brightness is chosen and outputted. They are black and white / color change-over camera equipped with the signal means for switching which chooses and outputs the monochrome signal generated with said signal-processing means when the brightness of said exterior is darker than said predetermined brightness.
[Claim 2] Receive the monochrome signal generated with said signal-processing means, and when said monochrome signal is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted. It has further a distinction means to output the 2nd filter change-over signal, and the 2nd black and white / color change-over signal when said monochrome signal is smaller than a predetermined threshold. Said filter means for switching Said infrared cut-off filter is inserted in the light-receiving side of said image sensor for said 1st filter change-over signal at the time of a carrier beam. Said infrared cut-off filter is sampled for said 2nd filter change-over signal from the light-receiving side of said image sensor at the time of a carrier beam. Said signal means for switching They are black and white / color change-over camera according to claim 1 which chooses and outputs the color signal by which said the 1st black and white / color change-over signal are generated with said signal-processing means at the time of a carrier beam, and chooses and outputs the monochrome signal by which said the 2nd black and white / color change-over signal are generated with said signal-processing means at the time of a carrier beam.
[Claim 3] An illuminance detection means to detect the brightness of said exterior and to output an illuminance signal, and said illuminance signal are received. When said illuminance signal is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted. It has further a distinction means to output the 2nd filter change-over signal, and the 2nd black and white / color change-over signal when said illuminance signal is smaller than a predetermined threshold. Said filter means for switching Said infrared cut-off filter is inserted in the light-receiving side of said image sensor for said 1st filter change-over signal at the time of a carrier beam. Said infrared cut-off filter is sampled for said 2nd filter change-over signal from the light-receiving side of said image sensor at the time of a carrier beam. Said signal means for switching They are black and white / color change-over camera according to claim 1 which chooses and outputs the color signal by which said the 1st black and white / color change-over signal are generated with said signal-processing means at the time of a carrier beam, and chooses and outputs the monochrome signal by which said the 2nd black and white / color change-over signal are generated with said signal-processing means at the time of a carrier beam.

[Claim 4] They are black and white / color change-over camera given in either of claim 1 to claims 3 which sample said clear glass from the light-receiving side of said image sensor by having further equal clear glass of said infrared cut-off filter and optical path length when said filter means for switching inserts said clear glass in the light-receiving side of said image sensor when said infrared cut-off filter is sampled from the light-receiving side of said image sensor, and said infrared cut-off filter is inserted in the light-receiving side of said image sensor.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to black and white / color change-over camera which has an image sensor.
[0002]
[Description of the Prior Art] With many color cameras, CCD is used as an image sensor. The sensitization property of this CCD reaches a 400nm - about 900nm wavelength field, and especially the sensibility of an infrared region (about 700nm or more) is high. If incidence of the light from a photographic subject is carried out to such CCD as it is, as for eye a card game and usual, redness would insert IR cut-off filter (infrared cut-off filter) between the lens and the light sensing portion of CCD, and the color reproduced will have removed the light of the wavelength component of an infrared region. By this, the color image by CCD has color repeatability comparable as seeing by human being's eyes.
[0003] With such a color camera, like day ranges, when bright in the exterior, the possible good color image of distinction of a color is acquired, but like night, when dark in the exterior, a good color image like day ranges is not acquired. This is because the light irradiated by the light sensing portion of CCD is restricted to the light of the wavelength component of a light field (about 400-700nm) by IR cut-off filter.
[0004] On the other hand, with monochrome camera which used CCD, since IR cut-off filter is not used, the image becomes a thing containing the wavelength component of an infrared region, and an image is acquired also under a low illuminance [like] at night. For this reason, it is used as a surveillance camera for crime prevention at night.
[0005]
[Problem(s) to be Solved by the Invention] Although the image was wanted to acquire the usual color image which can also distinguish a color daytime, and to be acquired also under a low illuminance as a surveillance camera for crime prevention at night, one camera was not able to perform such a monitor.
[0006] Although the video camera which can acquire selectively the special image by R, G, and IR and the usual color image by equipping JP,6-292213,A with B cut-off filter and an infrared cut filter, and switching these to it as a means to solve this problem is indicated, a configuration -- B cut-off filter is needed -- is complicated.
[0007] It was made in order that this invention might solve the above technical problems, and even if dark [in the exterior] and that object is bright, it is offering the camera which can acquire a clear image.
[0008] The further object of this invention is offering the camera which can switch a color image and monochrome image automatically according to external brightness.
[0009]
[Means for Solving the Problem] If this invention is followed, black and white / color change-over camera will be equipped with an image sensor, an infrared cut-off filter, a signal-processing means, a filter means for switching, and a signal means for switching. A signal-processing means generates a monochrome signal and a color signal according to the signal from an image sensor.

When the external brightness of a filter means for switching is brighter than predetermined brightness, an infrared cut-off filter is inserted in the light-receiving side of an image sensor, and when external brightness is darker than predetermined brightness, an infrared cut-off filter is sampled from the light-receiving side of an image sensor. When the external brightness of a signal means for switching is brighter than predetermined brightness, the color signal generated with a signal-processing means is chosen and outputted, and when external brightness is darker than predetermined brightness, the monochrome signal generated with a signal-processing means is chosen and outputted.

[0010] In the above-mentioned black and white / color change-over camera, when external brightness is brighter than predetermined brightness, an infrared cut-off filter is inserted in the light-receiving side of an image sensor. The light from which the wavelength component of an infrared region was removed by this is irradiated to the light sensing portion of an image sensor, and the color signal generated with a signal-processing means becomes the good thing which has good color repeatability excluding the component of an infrared region. This color signal is chosen by the signal means for switching, and is outputted to the exterior.

[0011] On the other hand, when external brightness is darker than predetermined brightness, an infrared cut-off filter is sampled from the light-receiving side of an image sensor. Thereby, the light also containing the wavelength component of an infrared region is irradiated to the light sensing portion of an image sensor, and the monochrome signal generated with a signal-processing means becomes a thing containing the wavelength component of an infrared region. This monochrome signal is chosen by the signal means for switching, and is outputted to the exterior.

[0012] Preferably, the above-mentioned black and white / color change-over camera receive further the monochrome signal generated with a signal-processing means in an input, when a monochrome signal is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted, and when a monochrome signal is smaller than a predetermined threshold, it has a distinction means to output the 2nd filter change-over signal, and the 2nd black and white / color change-over signal. The above-mentioned filter means for switching inserts an infrared cut-off filter in the light-receiving side of an image sensor for the 1st filter change-over signal at the time of a carrier beam, and an infrared cut-off filter is sampled for the 2nd filter change-over signal from the light-receiving side of an image sensor at the time of a carrier beam. The above-mentioned signal means for switching chooses and outputs the color signal by which the 1st black and white / color change-over signal are generated with a signal-processing means at the time of a carrier beam, and the monochrome signal by which the 2nd black and white / color change-over signal are generated with a signal-processing means at the time of a carrier beam is chosen and outputted.

[0013] In black and white / color change-over camera constituted as mentioned above, the level of the monochrome signal generated with a signal-processing means is changed according to external brightness. A distinction means detects the level of this monochrome signal, and it compares with a predetermined threshold. Consequently, when the level of a monochrome signal is larger than a predetermined threshold, the 1st filter change-over signal is sent to a filter means for switching from a distinction means, and the 1st black and white / color change-over signal are sent to a signal means for switching from a distinction means. In response to these signals, a filter means for switching inserts an infrared cut-off filter in the light-receiving side of an image sensor, and a signal means for switching chooses the color signal generated with a signal-processing means, and outputs it to the exterior.

[0014] When the level of a monochrome signal is smaller than a predetermined threshold, the 2nd filter change-over signal is sent to a filter means for switching from a distinction means, and the 2nd black and white / color change-over signal are sent to a signal means for switching from a distinction means. In response to these signals, a filter means for switching samples an infrared cut-off filter from the light-receiving side of an image sensor, and a signal means for switching chooses the monochrome signal generated with a signal-processing means, and outputs it to the exterior.

[0015] Preferably, the above-mentioned black and white / color change-over camera are further

equipped with an illuminance detection means and a distinction means. An illuminance detection means detects external brightness and outputs an illuminance signal. A distinction means receives an illuminance signal, when an illuminance signal is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted, and when an illuminance signal is smaller than a predetermined threshold, the 2nd filter change-over signal, and the 2nd black and white / color change-over signal are outputted. Moreover, the above-mentioned filter means for switching inserts an infrared cut-off filter in the light-receiving side of an image sensor for the 1st filter change-over signal at the time of a carrier beam, and an infrared cut-off filter is sampled for the 2nd filter change-over signal from the light-receiving side of an image sensor at the time of a carrier beam. Moreover, a signal means for switching chooses and outputs the color signal by which the 1st black and white / color change-over signal are generated with a signal-processing means at the time of a carrier beam, and the monochrome signal by which the 2nd black and white / color change-over signal are generated with a signal-processing means at the time of a carrier beam is chosen and outputted.

[0016] In black and white / color change-over camera constituted as mentioned above, the level of the illuminance signal generated with an illuminance detection means is changed according to external brightness. A distinction means detects the level of this illuminance signal, and it compares with a predetermined threshold. Consequently, when the level of an illuminance signal is larger than a predetermined threshold, the 1st filter change-over signal is sent to a filter means for switching from a distinction means, and the 1st black and white / color change-over signal are sent to a signal means for switching from a distinction means. In response to these signals, a filter means for switching inserts an infrared cut-off filter in the light-receiving side of an image sensor, and a signal means for switching chooses the color signal generated with a signal-processing means, and outputs it to the exterior.

[0017] When the level of an illuminance signal is smaller than a predetermined threshold, the 2nd filter change-over signal is sent to a filter means for switching from a distinction means, and the 2nd black and white / color change-over signal are sent to a signal means for switching from a distinction means. In response to these signals, a filter means for switching samples an infrared cut-off filter from the light-receiving side of an image sensor, and a signal means for switching chooses the monochrome signal generated with a signal-processing means, and outputs it to the exterior.

[0018] Preferably, the above-mentioned black and white / color change-over camera are further equipped with the equal clear glass of an infrared cut-off filter and the optical path length. When a filter means for switching inserts clear glass in the light-receiving side of an image sensor when an infrared cut-off filter is sampled from the light-receiving side of an image sensor, and an infrared cut-off filter is inserted in the light-receiving side of an image sensor, it samples clear glass from the light-receiving side of an image sensor.

[0019] In the above-mentioned black and white / color change-over camera, the optical distance to the light sensing portion of an image sensor does not change in the time of infrared cut-off filter insertion and clear glass insertion.

[0020]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained in detail with reference to a drawing. In addition, the same sign is given to the same or a considerable part among drawing, and the explanation is not repeated.

[0021] [Gestalt 1 of operation] drawing 1 is the block diagram showing black and white / whole color change-over camera configuration by the gestalt 1 of implementation of this invention. With reference to drawing 1 , this black and white / color change-over camera are equipped with a lens 1, the IR cut-off filter 2, dummy glass 3, a sliding mechanism 4, CCD5, a digital disposal circuit 6, a detector circuit 7, the condition sensor 8, a microcomputer 9, a motor 10, and a change-over switch 11.

[0022] IR cut-off filter removes the wavelength component (about 700nm or more) of an infrared region among the light which carries out incidence through a lens 1. Dummy glass 3 consists of clear glass, and has the optical path length equal to the IR cut-off filter 2. A sliding mechanism 4 ,

is driven by the motor 10, inserts either the IR cut-off filter 2 or dummy glass 3 between a lens 1 and CCD5, and samples another side from between a lens 1 and CCD5. CCD5 changes into an electrical signal the light irradiated by the light sensing portion through the IR cut-off filter 2 or dummy glass 3. A digital disposal circuit 6 generates color signal (composite video signal) Cout and a monochrome signal (luminance signal) Yout in response to the electrical signal from CCD5. A detector circuit 7 integrates with the value of the monochrome signal Yout generated by the digital disposal circuit 6, and outputs the integral value Vout. The condition sensor 8 outputs the condition signal S of L (logic low) level, when the IR cut-off filter 2 is inserted between a lens 1 and CCD5, and when dummy glass 3 is inserted between a lens 1 and CCD5, it outputs the condition signal S of H (logic yes) level. If Vertical Synchronizing signal VD is inputted from a digital disposal circuit 6, a microcomputer 9 Incorporate the value of the integral value Vout from the condition signal S and detector circuit 7 from the condition sensor 8, and the threshold V0 and the integral value Vout which were set up beforehand are compared. When the integral value Vout is larger than a threshold V0 and the integral value V0 of H level is smaller than threshold Vout, the filter change-over signal FC of L level, and the black and white / color change-over signal YC are outputted. A motor 10 the filter change-over signal FC of H level at the time of a carrier beam Drive a sliding mechanism 4 and dummy glass 3 is sampled from between a lens 1 and CCD5. The IR cut-off filter 2 is inserted between a lens 1 and CCD5, a sliding mechanism 4 is driven for the filter change-over signal FC of L level at the time of a carrier beam, the IR cut-off filter 2 is sampled from between a lens 1 and CCD5, and dummy glass 3 is inserted between a lens 1 and CCD5. A change-over switch 11 outputs color signal Cout by which black and white / color change-over signal YC of H level are generated by the digital disposal circuit 6 at the time of a carrier beam from the output terminal OUT of a camera, and outputs the monochrome signal Yout with which black and white / color change-over signal YC of L level are generated by the digital disposal circuit 6 at the time of a carrier beam from the output terminal OUT of a camera.

[0023] Next, actuation of black and white / color change-over camera constituted as mentioned above is explained.

[0024] The light by which incidence was carried out through the lens 1 is irradiated by the light sensing portion of CCD5 through the IR cut-off filter 2 or dummy glass 3.

[0025] When the IR cut-off filter 2 is inserted between a lens 1 and CCD5, the light from which the wavelength component (about 700nm or more) of an infrared region was removed by the light sensing portion of CCD5 is irradiated by the light sensing portion of CCD5. Since the sensitization property of CCD5 is about 400-900nm, the light of a 400-700nm wavelength component almost comparable as human being's relative luminous efficiency is changed into an electrical signal by CCD5 in this case.

[0026] When dummy glass 3 is inserted between a lens 1 and CCD5, the light by which incidence was carried out through the lens 1 is irradiated as it is by the light sensing portion of CCD5. Therefore, the light of the about 400-900nm wavelength component also containing the wavelength component of an infrared region is changed into an electrical signal by CCD5.

[0027] In response to this electrical signal, color signal Cout and a monochrome signal Yout are generated in a digital disposal circuit 6. The value of this monochrome signal Yout is changed corresponding to external brightness. Therefore, the gestalt 1 of this operation is integrated with the value of the monochrome signal Yout for one screen in a detector circuit 7, and let this integral value Vout with it be an index showing external brightness. And the integral value Vout is compared with the threshold V0 set up beforehand in a microcomputer 9, and processing for making the output of a camera into a color or black and white according to the result is performed.

[0028] Hereafter, processing of a microcomputer 9 is explained. Drawing 2 is a flow chart which shows the procedure of the microcomputer 9 shown in drawing 1 . With reference to drawing 2 , Vertical Synchronizing signal VD is first inputted into a microcomputer 9 from a digital disposal circuit 6 in step S1.

[0029] Then, in step S2, the integral value Vout from a detector circuit 7 is incorporated. Then, in step S3, the comparison with the integral value Vout and a threshold V0 is performed.

Hereafter, when the integral value Vout is larger than a threshold V0, and when small, it divides and explains.
[0030] (a) In Vout>V0, in this case, when external brightness is brighter than predetermined brightness, it corresponds, and the following processings are made in order to set to color signal Cout the video signal outputted from a camera.
[0031] First, in step S4, the condition signal S from the condition sensor 8 is incorporated. When the condition signal S is L level, it is in the condition that the IR cut-off filter 2 is inserted between a lens 1 and CCD5, and from the output terminal OUT of a camera, since it is in the condition that color signal Cout is outputted, it progresses to step S8 and processing of a microcomputer is completed.
[0032] When the condition signal S is H level, it is in the condition that dummy glass 3 was inserted between a lens 1 and CCD5, and since it is in the condition that the monochrome signal Yout is outputted, it progresses to step S5 from the output terminal OUT of a camera.
[0033] Then, in step S5, the filter change-over signal FC of H level is outputted to a motor 10, and black and white / color change-over signal YC of H level are outputted to a change-over switch 11. The carrier beam motor 10 drives a sliding mechanism 4 for the filter change-over signal FC of H level, dummy glass 3 is sampled from between a lens 1 and CCD5, and the IR cut-off filter 2 is inserted. Moreover, the carrier beam change-over switch 11 connects to the color signal Cout side the output terminal OUT by which black and white / color change-over signal YC of H level are connected to the monochrome signal Yout side. Consequently, color signal Cout will be outputted from the output terminal OUT of a camera.
[0034] Then, it progresses to step S8 and processing of a microcomputer is completed.
(b) In Vout<V0, in this case, when external brightness is darker than predetermined brightness, it corresponds, and the following processings are made in order to make into a monochrome signal Yout the video signal outputted from a camera.
[0035] First, in step S6, the condition signal S from the condition sensor 8 is incorporated. When the condition signal S is H level, it is in the condition that dummy glass 3 is inserted between a lens 1 and CCD5, and from the output terminal OUT of a camera, since it is in the condition that the monochrome signal Yout is outputted, it progresses to step S8 and processing of a microcomputer is completed.
[0036] When the condition signal S is L level, it is in the condition that the IR cut-off filter 2 was inserted between a lens 1 and CCD5, and since it is in the condition that color signal Cout is outputted, it progresses to step S7 from the output terminal OUT of a camera.
[0037] Then, in step S7, the filter change-over signal FC of L level is outputted to a motor 10, and black and white / color change-over signal YC of L level are outputted to a change-over switch 11.
[0038] The carrier beam motor 10 drives a sliding mechanism 4 for the filter change-over signal FC of L level, the IR cut-off filter 2 is sampled from between a lens 1 and CCD5, and dummy glass 3 is inserted.
[0039] Moreover, the carrier beam change-over switch 11 connects to a monochrome signal Yout side the output terminal OUT by which black and white / color change-over signal of L level are connected to the color signal Cout side. Consequently, a monochrome signal Yout will be outputted from the output terminal OUT of a camera.
[0040] Then, it progresses to step S8 and processing of a microcomputer is completed.
According to the gestalt 1 of this operation, as mentioned above by forming a detector circuit 7, a microcomputer 9, a motor 10, and a change-over switch 11 When the integral value Vout from a detector circuit 7 is larger than the predetermined threshold V0 The IR cut-off filter 2 is inserted between a lens 1 and CCD5, and color signal Cout is outputted to it from the output terminal OUT of a camera. When the integral value Vout from a detector circuit 7 is smaller than the predetermined threshold V0, dummy glass 3 is inserted between a lens 1 and CCD5, and a monochrome signal Yout is outputted to it from the output terminal OUT of a camera. Consequently, the camera which switches a color image and monochrome image automatically according to external brightness can be offered. Moreover, since it is not necessary to use a photometry sensor etc. specially in order to detect external brightness with the level of a

monochrome signal Yout, it is realizable with an easy configuration.
[0041] [Gestalt 2 of operation] drawing 3 is the block diagram showing black and white / whole color change-over camera configuration by the gestalt 2 of implementation of this invention. With reference to drawing 3 , this black and white / color change-over camera are equipped with the illuminance sensor 12 instead of the detector circuit 7 shown in drawing 1 .
[0042] The illuminance sensor 12 detects external brightness and outputs the illuminance signal Vs according to the brightness.
[0043] With the gestalt 2 of this operation, the illuminance signal Vs is compared with the threshold V0 set up beforehand in a microcomputer 9, and processing for making the output of a camera into a color signal or a monochrome signal according to that result is performed.
[0044] Hereafter, processing of a microcomputer 9 is explained. Drawing 4 is a flow chart which shows the procedure of the microcomputer 9 shown in drawing 3 . With reference to drawing 4 , Vertical Synchronizing signal VD is first inputted into a microcomputer 9 from a digital disposal circuit 6 in step S11.
[0045] Then, in step S12, the illuminance signal Vs from the illuminance sensor 12 is incorporated.
[0046] Then, in step S13, the comparison with the illuminance signal Vs and a threshold V0 is performed.
[0047] When the illuminance signal Vs is larger than a threshold V0, in order to set to color signal Cout the video signal outputted from a camera, step S4 shown in drawing 2 in steps S14, S15, and S18 and the same processing as S5 and S8 are carried out.
[0048] When the illuminance signal Vs is smaller than a threshold V0, in order to make into a monochrome signal Yout the video signal outputted from a camera, the same processing as steps S6, S7, and S8 shown in drawing 2 in steps S16, S17, and S18 is made.
[0049] According to the gestalt 2 of this operation, as mentioned above by forming a microcomputer 9, a motor 10, the change-over perpendicular 11, and the illuminance sensor 12 When the illuminance signal Vs from the illuminance sensor 12 is larger than the predetermined threshold V0 The IR cut-off filter 2 is inserted between a lens 1 and CCD5, and color signal Cout is outputted to it from the output terminal OUT of a camera. When the illuminance signal Vs from the illuminance sensor 12 is smaller than the predetermined threshold V0, dummy glass 3 is inserted between a lens 1 and CCD5, and a monochrome signal Yout is outputted to it from the output terminal OUT of a camera. Consequently, the camera which switches a color image and monochrome image automatically according to external brightness can be offered.
[0050] In addition, although the microcomputer 9 has detected the illumination-by-direct-light signal Vs, the integrating circuit which integrates with the illuminance signal Vs is prepared, and you may make it a microcomputer 9 detect the output of this integrating circuit with the gestalt 2 of this operation.
[0051] Moreover, although processing with a microcomputer 9 is performed about the Vertical Synchronizing signal at each time with the gestalten 1 and 2 of the above-mentioned implementation, it is good also as every several times like every 5 times 10 times of every in this.

[0052] Moreover, although the insertion point of the IR cut-off filter 2 and dummy glass 3 is made into between a lens 1 and CCD5, you may be before a lens as long as it is the light-receiving side of CCD5.
[0053] Moreover, if it is a camera using an image sensor like CCD, it can apply, for example, can apply to a surveillance camera, a video camera, a digital still camera, etc.
[0054] Moreover, although the gestalt of the above-mentioned implementation uses one threshold V0 When the integral value Vout or the illuminance signal Vs becomes large gradually and the threshold of the higher one is reached using two mutually different thresholds, replace with dummy glass 3 and the IR cut-off filter 2 is inserted. When the integral value Vout or the illuminance signal Vs becomes small gradually and the threshold of the lower one is reached, it replaces with the IR cut-off filter 2, and dummy glass 3 is inserted, that is, a hysteresis characteristic may be given. In this case, even if external brightness is near a threshold, the image which the IR cut-off filter 2 and dummy glass 3 did not switch to **, and was always

stabilized is acquired.
[0055] It should be thought that the gestalt of the operation indicated this time is [no] instantiation at points, and restrictive. The range of this invention is shown by the above-mentioned not explanation but claim, and it is meant that all modification in a claim, equal semantics, and within the limits is included.
[0056]
[Effect of the Invention] Black and white / color change-over camera according to this invention The filter means for switching which inserts an infrared cut-off filter in the light-receiving side of an image sensor when external brightness is brighter than predetermined brightness, and samples an infrared cut-off filter from the light-receiving side of an image sensor when external brightness is darker than predetermined brightness, The color signal generated with a signal-processing means when external brightness is brighter than predetermined brightness is chosen and outputted. When external brightness is darker than predetermined brightness, in order to have the signal means for switching which chooses and outputs the monochrome signal generated with a signal-processing means, When external brightness is darker than predetermined brightness as a color camera with which the usual color image which can also distinguish a color when external brightness is brighter than predetermined brightness (for example, daytime) is acquired (for example, night), it can function as a monochrome camera of high sensitivity under a low illuminance.
[0057] Moreover, when the monochrome signal generated with a signal-processing means is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted, and since it has a distinction means to output the 2nd filter change-over signal, and the 2nd black and white / color change-over signal when a monochrome signal is smaller than a predetermined threshold, a change-over of a color image / monochrome image can be automatically performed according to external brightness.
[0058] Moreover, in order to make into the index showing external brightness level of the monochrome signal generated with a signal-processing means, it is not necessary to establish a photometry means specially.
[0059] Moreover, an illuminance detection means to detect external brightness and to output an illuminance signal, When an illuminance signal is larger than a predetermined threshold, the 1st filter change-over signal, and the 1st black and white / color change-over signal are outputted. Since it has a distinction means to output the 2nd filter change-over signal, and the 2nd black and white / color change-over signal when an illuminance signal is smaller than a predetermined threshold, a change-over of a color image / monochrome image can be automatically performed according to external brightness.
[0060] Moreover, since it has the filter means for switching which samples clear glass from the light-receiving side of an image sensor when clear glass is inserted in the light-receiving side of an image sensor when an infrared cut-off filter is sampled from the infrared cut-off filter, equal clear glass [of the optical path length], and light-receiving side of an image sensor, and an infrared cut-off filter is inserted in the light-receiving side of an image sensor, if the infrared cut-off filter is inserted, the focus of the optical image by which image formation is carried out to the light-receiving side of an image sensor can be kept constant irrespective of no.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing black and white / whole color change-over camera configuration by the gestalt 1 of implementation of this invention.
[Drawing 2] It is the flow chart which shows actuation of the microcomputer shown in drawing 1 .

[Drawing 3] It is the block diagram showing black and white / whole color change-over camera configuration by the gestalt 2 of implementation of this invention.
[Drawing 4] It is the flow chart which shows actuation of the microcomputer shown in drawing 3 .

[Description of Notations]
2 IR Cut-off Filter
3 Dummy Glass
4 Sliding Mechanism
5 CCD
6 Digital Disposal Circuit
9 Microcomputer
10 Motor
11 Change-over Switch
12 Illuminance Sensor
Cout Color signal (composite video signal)
Yout Monochrome signal (luminance signal)
FC Filter change-over signal
YC Black and white / color change-over signal

[Translation done.]

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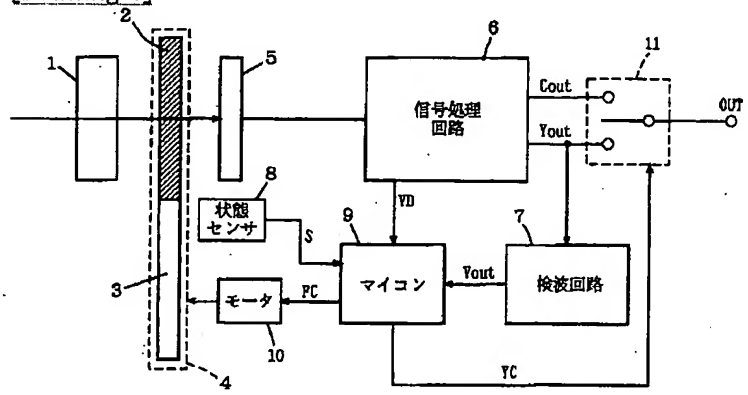
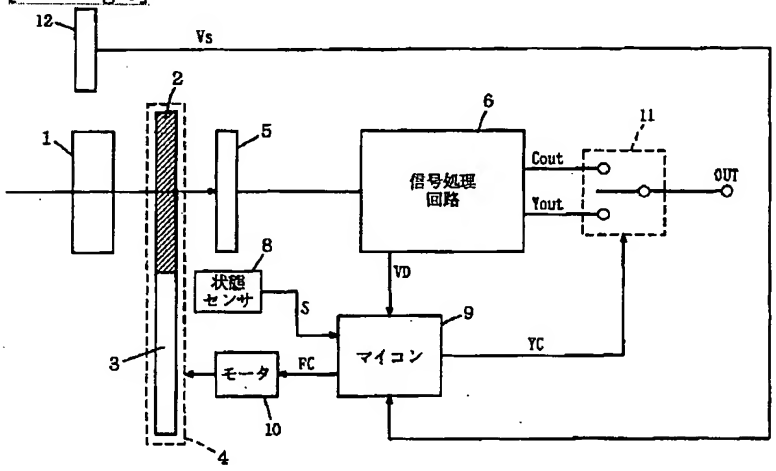
DRAWINGS

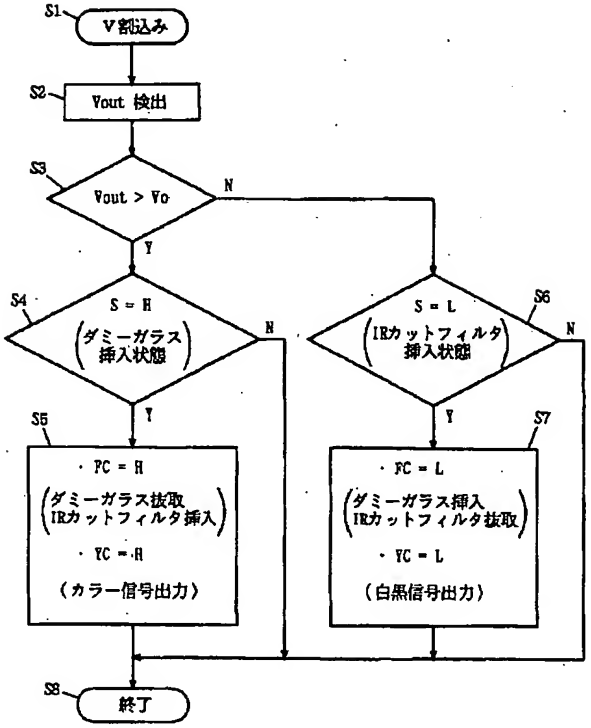
[Drawing 1]



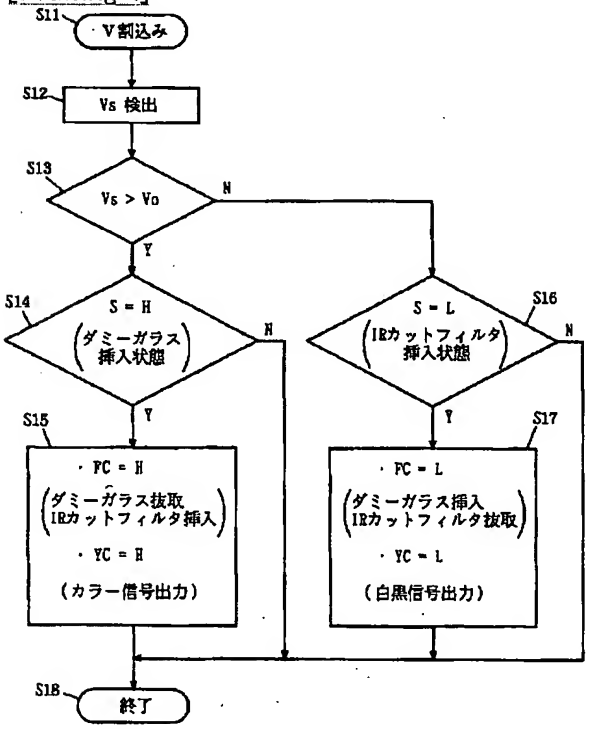
[Drawing 3]



[Drawing 2]



[Drawing 4]



[Translation done.]